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Carlos Santiago Caballero

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Introduction

Tithes have been extensively used to estimate the evolution of agrarian output in modern times. Since the compilation of international tithe series made by Ladurie and Goy, the tax has been considered one of the main if not the only reliable source to estimate long term production series in the primary sector (Ladurie and Goy 1982). Although the collection of the tithe was common to most of Europe, the enforcement of the tax and the quality of the records available differ from one country to another. In this sense Spain is a generous region, the quality of the tithe records kept by the Spanish Catholic Church have attracted the interest of scholars not just in Spain but outside its frontiers.[2]

Since the 1980s the number of studies published presenting regional tithe series in Spain have increased considerably. In Old Castile we count on long term tithe series for Segovia (Garcia Sanz 1982) and Leon (Sebastian Amarilla 1992). In Andalusia there are series for the west of the region (Ponsot 1969) and the province of Malaga (Sanchez-Blanco 1982). There are also series for the coastland regions of Murcia (Lemeneunier 1982), Valencia (Ardit 1989 and Palop Ramos 1982) Galicia (Eiras Roel 1982) and for the Basque Country (Bilbao and Fernandez Pinedo 1982). The island of Mallorca also counts on tithe series from the 16th until the 18th century (Vidal 1978). Finally the tithe series for the archbishop for the archbishopric of Toledo in New Castile from 1463 until 1699 were also published (Lopez-Salazar and Martin Galan 1981).

This paper tries to improve the information available for the interior of Spain, presenting the new series for the province of Guadalajara in the north of New Castile. The series cover the whole eighteenth century, and include the four main grains that

[2] The university of Cambridge organized a special conference on Spanish tithe series on the 4th of April 2008.

were cultivated in the region, wheat, barley, rye and oats, products that represented the bulk of the agrarian output in New Castile and especially in the province of Guadalajara. Therefore they connect with the end of the series for New Castile published by Lopez-Salazar and Martin Galan, and provide a very long term vision of the evolution of grain production in the region. Together they present the evolution of grain production in New Castile from the times of the Spanish Reconquista to the climax of the Napoleonic wars.

Methodology and nature of the source

From Old English *teotha* (tenth), the tithe represented a yearly tax that had to be paid by every producer to the ecclesiastical authorities. The first citations to the tithe can be found in the Old Testament, where according to the Genesis Abram paid the tithe to Melchizedek, the King of Salem (Jerusalem) who also occupied the charge or priest of El Elyon ("the Most High God") (Genesis 14:18). It was a common feature in the economic framework of the middle ages and of modern European countries. In Spain the tithe survived until the *Desamortizacion of Mendizabal*, a process of confiscation of ecclesiastical properties led by the liberal Spanish government in 1837.

Tithes reflect the evolution of real production trends when two basic conditions are met. Firstly the amount that the tithe represents and therefore the amount that the peasant is taxed has to be constant during the whole period, and if it changes then we should know this happened to calibrate the estimations. If that is not the case, then the estimations of real production would lead to erroneous conclusions and miscalculations. Secondly the effects of cheating have to be small. If an important share of the harvest is hidden from the eyes of the ecclesiastical authorities that collected the tithe, the estimation of total production would again be seriously undermined. In response to the first condition, the

tithe series presented in this work always represented ten per cent of the total harvest. There was a wide range of information about ecclesiastical taxes in the tithe books that not only contained tithe records. For instance apart from the ten per cent of the tithe, the books also included the payment of primicias, a tax that did not represent a direct percentage of the harvest but a fixed tax that was paid once the production of the peasant surpassed a certain threshold under which the producer was exempt from paying it. However, this information has been excluded from the estimations and therefore do not influence the results in any way. The second important point is that the tithe remained at a flat ten per cent during the whole eighteenth century, and therefore miscalculations based on the movements of the tax should not represent a problem. About the second matter, the occultation of part of the harvest by the peasant, cheating was not a significant force until the political and social turmoil created by the Napoleonic wars in the early nineteenth century (Garcia Sanz 1982). One of the ways of detecting the amount of cheating was the existence of trials for hiding part of the harvest. These sort of trials existed and they normally were recorded. The lack of information about them in the books reflects the fact that cheating was still not as generalized as it would be in the following century. The option of cheating was not just risky, but also normally condemned to failure in Guadalajara where villages were very small and therefore the control of the local priest very high. The description of the tithes and the way the tax was defined was perfectly explained in the answers to the Catastro de la Ensenada.

To the fifteenth [question] they said that in this village of Alboreca there are several taxes, tithe rights and primicia that in the case of wheat, barley and oats for every ten fanegas one is paid. In the case of wool one out of ten [units], one lamb out of every ten

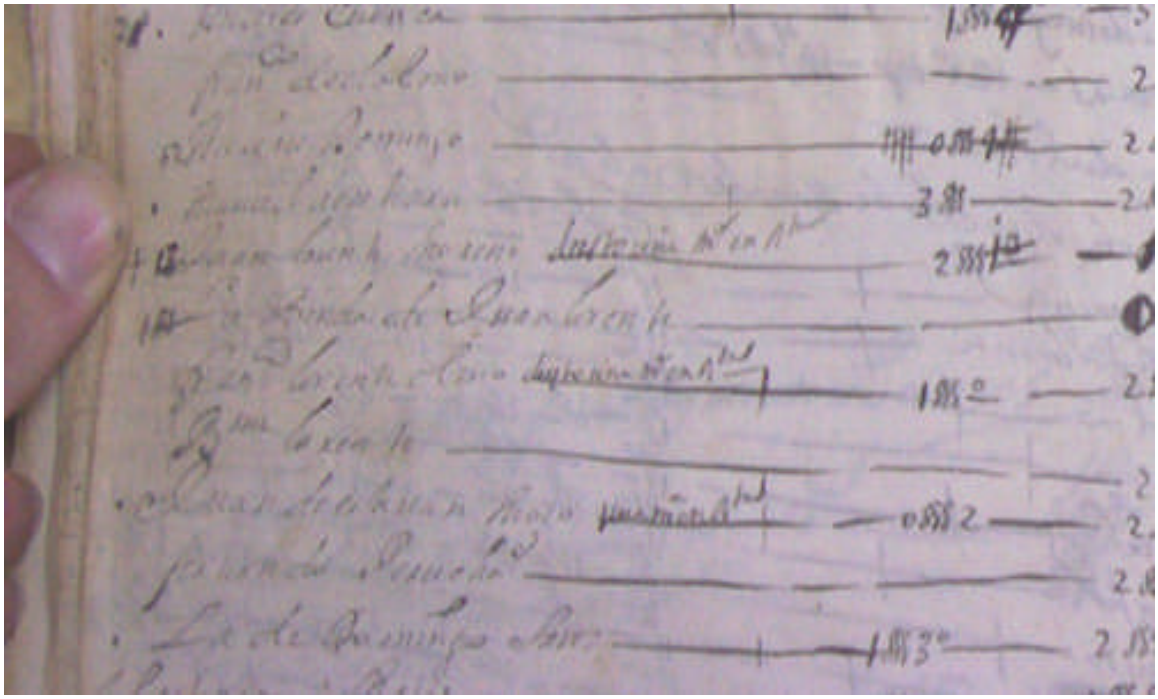
and also one cheese out of every ten, and that in the primicia one half fanega is paid for every eleven, for all these species and also for rye and peas if they are cultivated. If that amount is not reached everything that exceeds ten will be collected until the previously mentioned eleven. And although the harvest exceeded those eleven nothing else will be paid. And if the production does not reach ten half fanegas then nothing will be paid at all from this right of primicias, understanding that this right is not performed in the case of oats, and that it is a right that is property of the priest of the parish of the mentioned village of Alboreca and as such he receives it.[3]

The tithe series presented in this thesis have been extracted from the tithe books of every village and town included in the sample. [4] The books were written in every parish and in the twentieth century were transferred and centralized in the Historical Diocesan Archive of Sigüenza. The tithe books are a very rich source of information for economic historians, and include detailed records about the amount that was taxed by the church to every peasant in every town and village. This level of detail is not a common feature, as most of the records in countries like England only kept the total amount of product taxed and not the distribution per producer. The use of tithe records to analyse the evolution of agrarian production has been a common feature in the economic history of agriculture (Ladurie and Goy 1982).

[3] Catastro de la Ensenada. Book of Alboreca, pp. 241-242.

[4] The series corresponds to the following municipalities and parishes: Alboreca/San Andres, Alcuneza/ San Pedro, Alpedroches/Asuncion de Nuestra Señora, Angon/Santa Catalina, Anquela del Pedregal/Asuncion de Nuestra Señora, Aragosa/Nuestra Señora de la Paz, Bañuelos/Asuncion de Nuestra Señora, Canales de Molina/San Cristóbal, Cantalojas/San Julian, Castejon de Henares/San Miguel, Ciruelos del Pinar/Santa Magdalena, La Fuensaviñan/Asuncion de Nuestra Señora, Galve de Sorbe/Asuncion de Nuestra Señora, Herreria/Asuncion de Nuestra Señora, Hijes/Natividad, Ledanca/Asuncion de Nuestra Señora, Miedes de Atienza/Natividad, Mohares/San Cristóbal, Riba de Saelices/Santa Maria Magdalena, Rillo de Gallo/Santo Domingo de Guzman, Santiuste/Transfiguración, Sienes/Santa Eulalia, Torrubia/Asuncion de Nuestra Señora, Trillo/Asuncion de Nuestra Señora, Valdelcubo/Santiago, Villares de Jadraque/Natividad and Villaseca de Henares/San Blas.

Figure 1: Example of an eighteenth century tithe book



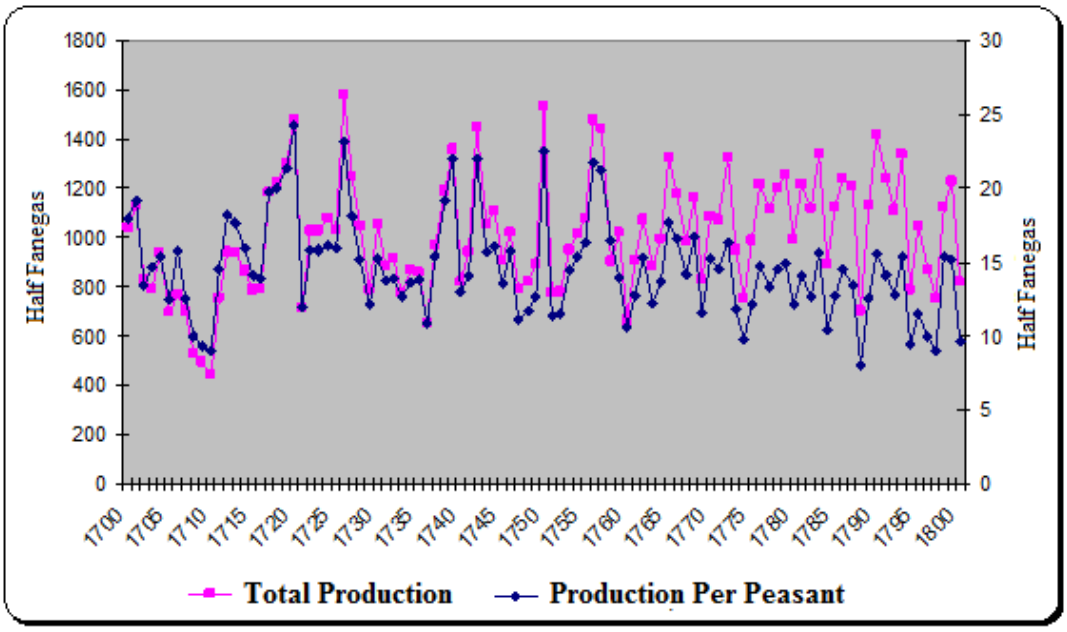
The series collected start in 1678 and finish in 1811, although the amount of information available differs significantly depending on the municipality. There are complete series for the whole eighteenth century for fourteen municipalities. On the other hand the village of Trillo only has information of tithes from 1760. A total of 25 tithe series were collected, and have been smoothed with the application of a 9 years moving average centred in the fifth year. The existence of small information gaps was solved by using simple interpolation, in the case of longer periods of time like four or five years, the results were based on an estimation extracted from the other tithe series in all the cases with correlation coefficients higher than 70 per cent.

Reliability of the series

One of the most controversial issues in the utilisation of the tithe concerns the information that it provides. Tithes tell us how total agrarian production changed, but information about per capita output or productivity figures is more difficult to obtain. The number of producers changed over time, as did the amount of land that was put

under cultivation. We can however check this relationship with the information provided in the tithe books taking as a case study the village of Bañuelos, a municipality where we count on very detailed information for every year. For every year of the eighteenth century, the total production was divided by the amount of producers in order to get a series of output per producer. This variable was then compared to the series of total production estimated from the tithe series, the results are presented in the next graph.

Figure 2: Total Production v. Production per peasant (I) in Bañuelos, 1700-1800

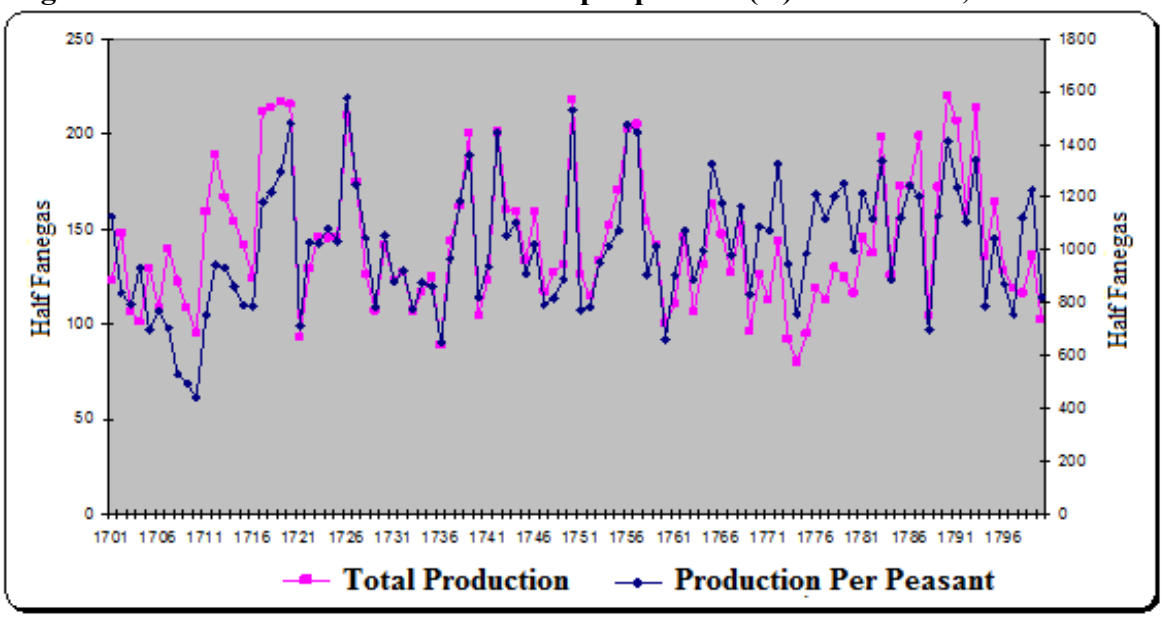


Source: Tithe book of the municipality of Bañuelos.

The correlation between both variables is very high and statistically significant (R=0.78), pointing out that the trends presented by the study of tithes are a good estimator of the evolution of output per producer. However, another important issue is deciding if output per producer is a good proxy of productivity. As stated before, the number of producers changed during the eighteenth century and therefore the sample of producers did too, introducing noise in the estimation. This explains partially why the correlation was weaker during the second half of the century. To solve that problem we

took advantage once more from the rich information provided in the tithe books, where each producer being taxed was identified with his Christian name and two first surnames. Therefore, it is possible to follow the output of every producer on a yearly basis. We created a sample of producers whose production was followed during the whole eighteenth century. The sample was carefully chosen to be sure that it included producers of different sizes and therefore is a good representation of the area as a whole. On the other hand, producers tended to disappear after a period of approximately 20 years, probably because they passed away. When this happened, the producer was immediately replaced by another one being sure that the new one shared the same characteristics than the last one in terms of total output produced. Therefore, a consistent and diversified sample of producers was created and the evolution of their output was compared with the evolution of total production extracted from the tithes. The correlation is again very high and statistically significant (R=0.78) showing that the evolution of tithes are a good estimation of the trends of output per produced and therefore proving its utility as a representative proxy.

Figure 3: Total Production v. Production per peasant (II) in Bañuelos, 1700-1800



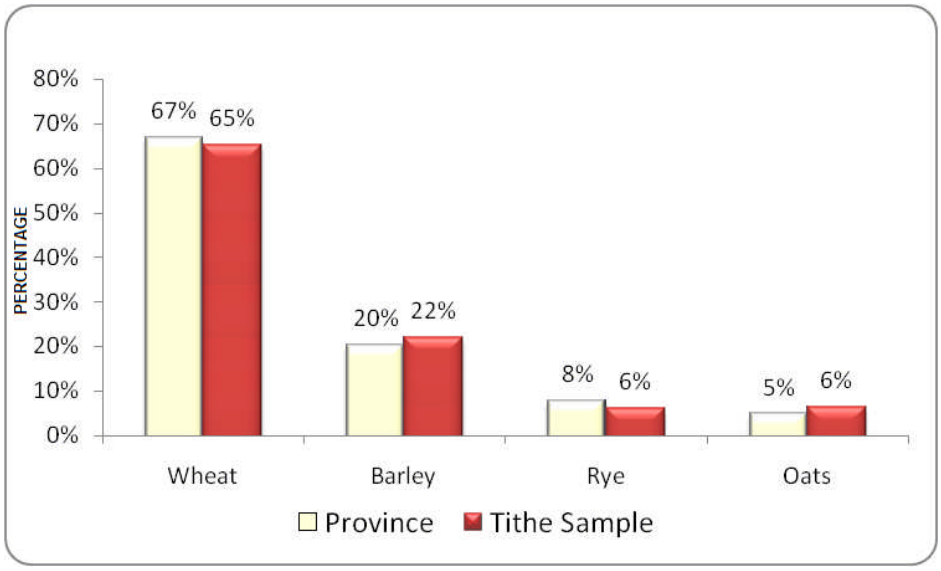
Source: Tithe book of the municipality of Bañuelos

We can also check the reliability of the tithe estimations by comparing their results with the ones presented in the Catastro de la Ensenada. In the general survey, one of the questions asked about the average production per year during the last five years. The survey in Guadalajara took place in 1751 and therefore the information provided in the Catastro includes the average production between 1747 and 1751, as one of the answers shows:

"To the sixteenth [question] they said that for every year of the last five, that were counted from the year of one seventeen forty seven until the year of seventeen fifty one, both inclusive, the tithe accounts …"

Therefore, we can compare the information of the Catastro with the information obtained from the tithe series between 1747 and 1751. The next figure presents the shares of every grain in the total production of grain for the period 1747-1751 presented in both the general survey and the tithe series. The results are very similar and therefore support the reliability of the estimations calculated from the tithes.

Figure 4: distribution of grain production in volume 1747-1751



Source: Same as footnote 3 and Catastro de la Ensenada

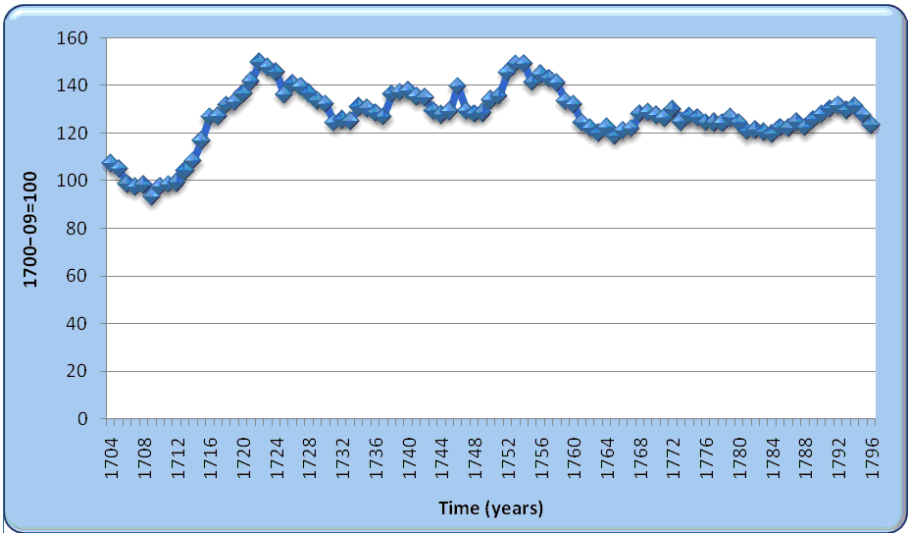
The production of grain in eighteenth century Guadalajara

The first half of the eighteenth century was in general a period of economic growth and agrarian expansion in all Spain. Some areas of the interior however had a slower recuperation from the seventeenth century crisis and did not recover the production levels of the end of the sixteenth century until the mid and in some cases even late eighteenth century (Marcos Martin 2000). While in the interior the increase in agrarian production was based on an extension of arable land (Anes Alvarez 1970:196), in the North of Spain and the Mediterranean coast however were able to improve productivity by introducing new products like maize. New Castile was not able to surpass the production levels that had been reached during the late sixteenth century. The general trends during the eighteenth century show a very stable production that increased in the middle of the century to be followed by a crisis in the 1760s and a brief recovery to finish the century with another production crisis (Marcos Martin 2000).

The series for Guadalajara seem to confirm this general view. In order to estimate total grain output, the production of all the grains was aggregated by volume. The results show that grain production suffered a production crisis during the first years of the eighteenth century and that was a continuation of a longer depression that started during the last decades of the seventeenth century. The series show an absolute minimum in the last years of the 1710s and a later and strong recovery when the production of grain increased by almost 50 per cent until the middle of the 1720s. Thereafter, the data shows a period of very slow growth that lasted 25 years until the last period of production growth that took place in the first half the 1750s when the production of grain increased by almost 30 per cent. The last decades of the eighteenth century were a period of crisis and minimum growth that coincides with the political crisis of the old

regime that affected all of Europe and that started with the economic crisis of the late 1750s. In the case of Guadalajara, the production of grain fell by more than 20 per cent between 1754 and 1763 and the levels of production achieved in the early 1750s would not be reached again during the rest of the century. The following figure presents the evolution of total aggregated grain production, wheat, barley, rye and oats in volume in the sample for Guadalajara.[5]

Figure 5: Grain production in Guadalajara 1700-1800 (9 years moving average)

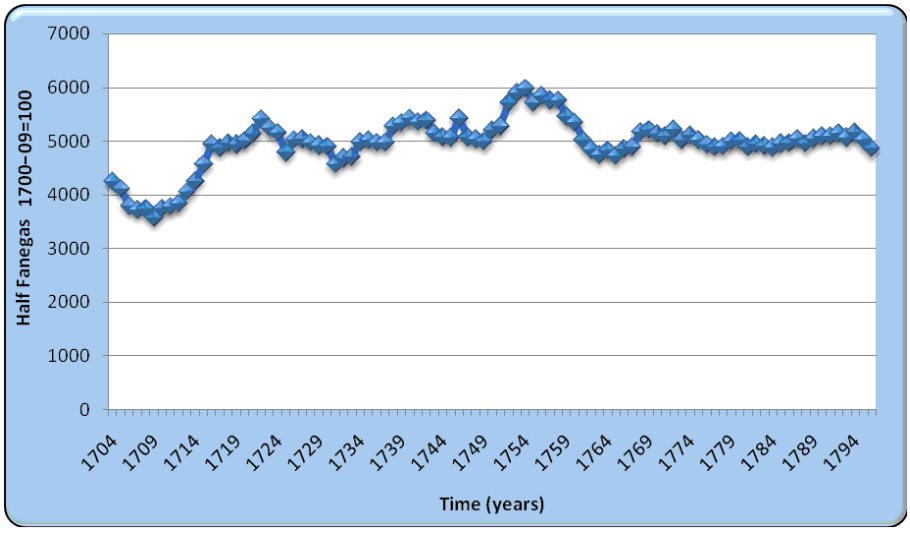


Source: Same as footnote 3

Dividing the series by grain, we can observe some differences. In the case of wheat the behaviour of the series is exactly the same that has been described above. The reason is simple in that wheat represented more than two thirds of the total production of grains and therefore it was the most influent grain of the sample.

[5] The municipalities are Madrigal, Miedes, Santiuste, Hijes, Navalpotro, Imon, Ciruelos, Anquela, Castejon, Aragosa, Villaseca, Sienes and Villares de Jadraque.

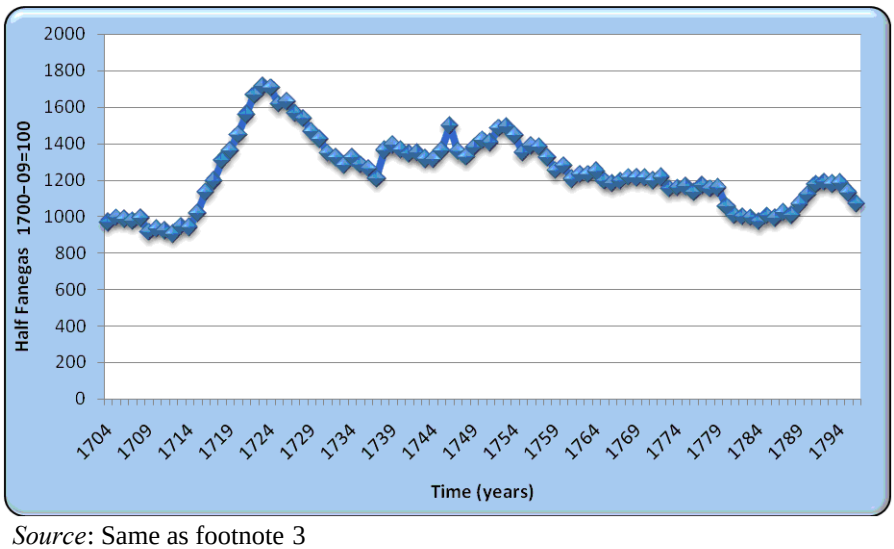
Figure 6: Wheat production in Guadalajara 1700-1800 (9 years moving average)



Source: Same as footnote 3

Barley was the second most important grain in terms of volume. The evolution of barley production was again similar to wheat, although in this case the changes were more intense as the series presented a higher volatility. Production at the end of the century presented very similar values to those achieved during the first decades of the eighteenth century.

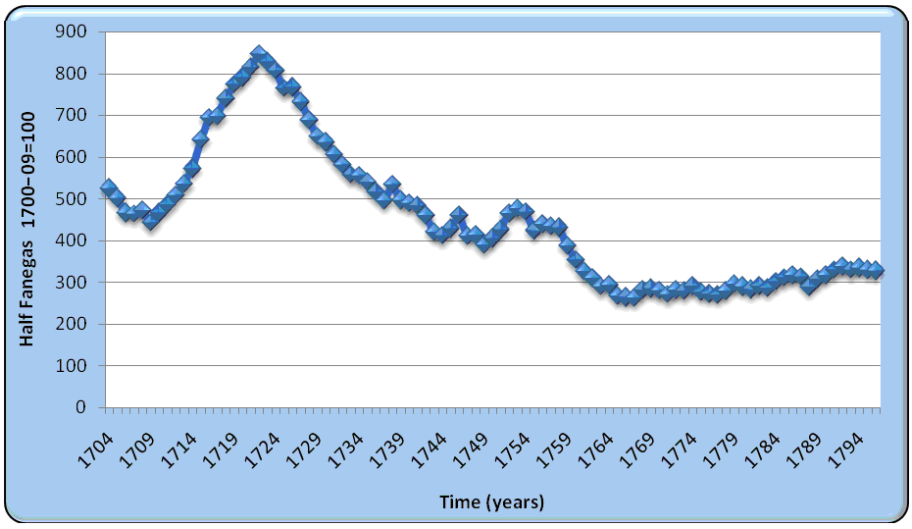
Figure 7: Barley production in Guadalajara 1700-1800 (9 years moving average)



Source: Same as footnote 3

Rye was one of the minor grains and also presents more volatile than wheat and barley production. The crisis of the early eighteenth century was followed by a very intense recovery that increased the production from 450 half fanegas to more than 800, almost doubling the production in less than twenty years. However, the production during the following decades would rapidly fall until the end of the 1760s when it reached its lowest point.

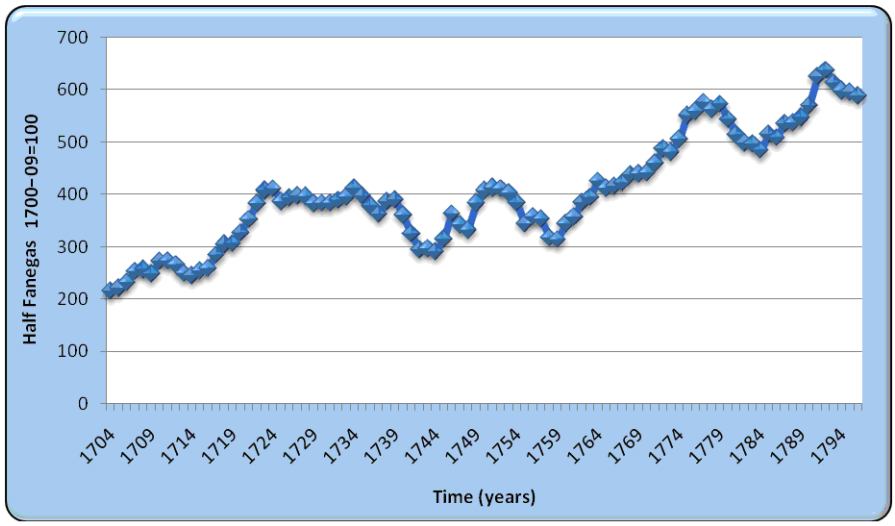
Figure 8: Rye production in Guadalajara 1700-1800 (9 years moving average)



Source: Same as footnote 3

On the other hand, the production of oats is the only one that can be clearly defined as a success story. The levels of the early eighteenth century of 200 half fanegas moved to more than 600 by the end of the century, with clear peaks and troughs that however showed a very clear positive trend.

Figure 9: Oats production in Guadalajara 1700-1800 (9 years moving average)



Source: Same as footnote 3

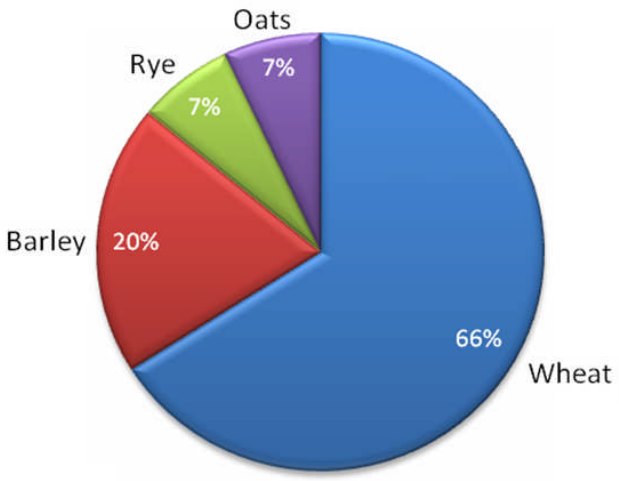
Therefore, we can conclude that although the movements of grain production in eighteenth century Guadalajara depended on the sort of grain, there are some general trends that followed the next phases (Gonzalez Enciso 1992).

During the first decade of the eighteenth century, the series show a deep crisis that started in the last decades of the seventeenth century. The crisis was followed by a quick recovery of the levels lost in the previous decades that lasted until the early 1720s. However the rest of the decade until 1731 showed a second crisis with an average fall in the production of more than 20 per cent. The 1730s and 1740s were a period of recovery that continued through the first half of the 1750s when production grew by more than 20 per cent. The deepest recession of the century took place during the period 1755-1763 when grain production fell in Guadalajara by 30 per cent. Finally the last third of the century was a period of minimum growth.

Distribution of grains

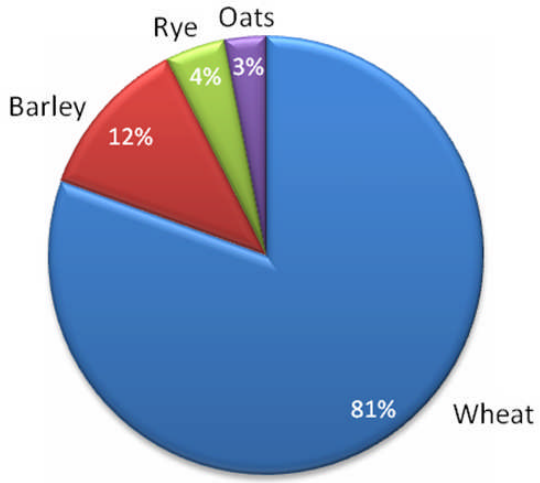
In terms of distribution, as previously explained, the production of grain was strongly dominated by the presence of wheat. In the sample collected, for the whole eighteenht century wheat represented two thirds of the total production of grain in volume, followed by barley with a 20 per cent, and then rye and oats with a share of 7 per cent each one. However, if we transform the production from kind to cash, the difference and share of wheat increases considerably as a consequence of being by far the most expensive of the four grains.[6] Transforming the numbers from volume into grams of silver using the price series of Madrid, the share of wheat rises from 66 per cent to 81 per cent, while the values of the so called inferior grains is reduced. In the case of barley, the shares falls from 20 per cent to 12 per cent, in rye from 7 per cent to 4 per cent and the share of oats falls from 7 per cent to 3 per cent.

Figure 10: Shares in Volume, mid 18th century



Source: Same as footnote 3

Figure 11: Shares in Value, mid 18th century

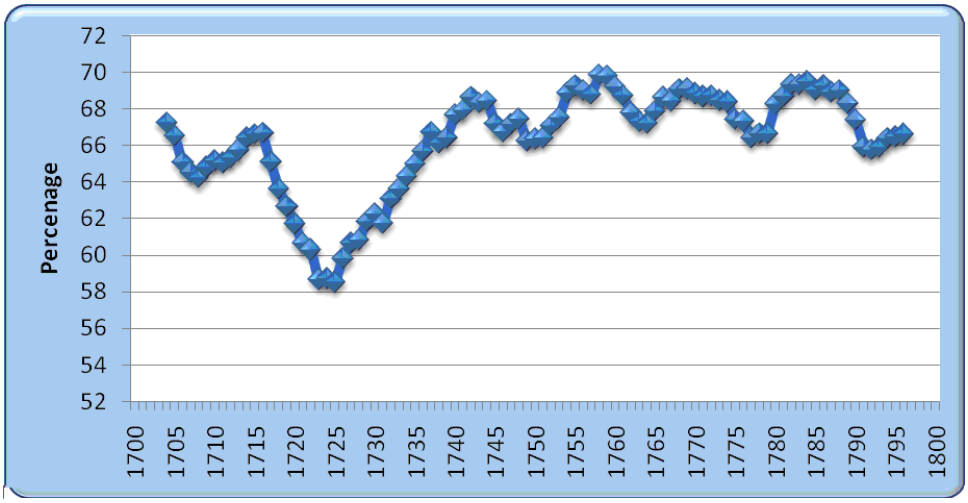


Source: Same as footnote 3

[6] The prices used were a combination of Hamilton for Toledo and the series that I created for Madrid.

The share of wheat in total production is a key variable that has been closely examined by economic historians. The reason is that it reflects not just the influence of that grain in the productive structure of the economy, but also works as an indirect estimator of other variables such as urbanization rates. In early modern and modern Spain and unlike in many other parts of Europe, the sort of bread consumed was mainly white, produced using wheat instead of a mixture with other grains. Therefore, an increasing share of wheat production would mean that the population living in cities was increasing and demanding more wheat to satisfy the increase in the demand for white bread. The changes in annual percentages of wheat in total grain production in Guadalajara is presented in the following figure.

Figure 12: distribution % of wheat in grain production (9 years moving average) in Guadalajara (1700-1800)



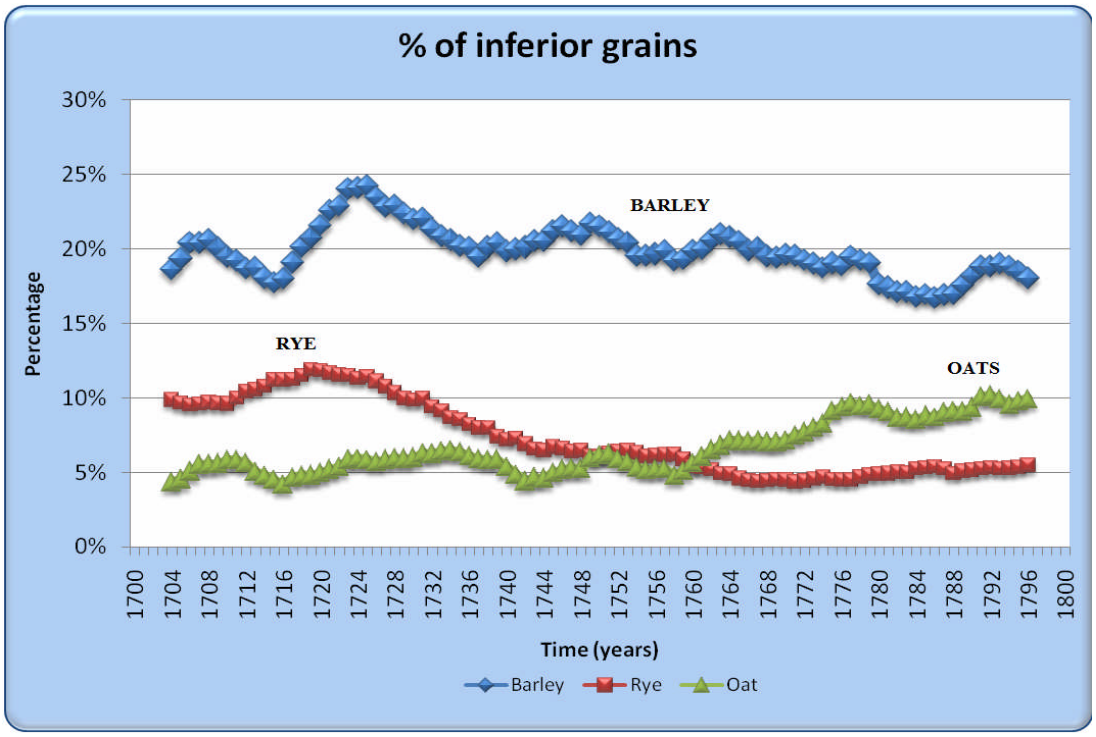
Source: Same as footnote 3

The share of wheat in Guadalajara suffered a considerable crisis during the first third of the eighteenth century falling 10 points from 68 per cent in 1705 to 58 per cent in 1725. On the other hand, the weight of rye and above all of barley increased, representing 27 per cent and 14 per cent respectively of the growth in total production that took place between 1709 and 1722. Those weights were clearly larger to the shares that they

represented in the economy of Guadalajara and that have been presented above. After the 1730s, the production of wheat rose more quickly than the production of other grains, an increase that is related to the demographic growth that took place in the province of Guadalajara after the demographic crisis of the 1730s. The increasing demand combined with the resistance of wheat to the production crisis of the 1720s increased the share of wheat from 58 per cent to 70 per cent. The second half of the eighteenth century did not see significant changes in the weight of wheat that remained at very high levels, again probably influenced by the increasing population that amplified the demand of white bread and therefore wheat. These trends are very similar to the ones presented in other regions in the interior of Spain, like the case of Segovia where the same decline in the share of wheat took place in the early eighteenth century, followed by a recovery during the following decades (Garcia Sanz 1982).

The evolution of barley, rye and oats were again very different. As the series of production showed, the production of oats increased while the other three grains stagnated or declined. Therefore, the share of oats in grain production increased from less than 5 per cent in the early eighteenth century to 10 per cent in the 1790s. Barley and rye show very similar trends reaching maximums in the mid 1720s that were followed by an intense decline during the rest of the century. Thus, the supremacy of wheat was clear during most of the eighteenth century followed by the success of oats that doubled their presence in the production of grain. This primacy of wheat and success of oats took place at the expense of barley and rye that lost importance during most of the century.

Figure 13: Percentage of inferior grains in grain production (9 years moving average) in Guadalajara 1700-1800

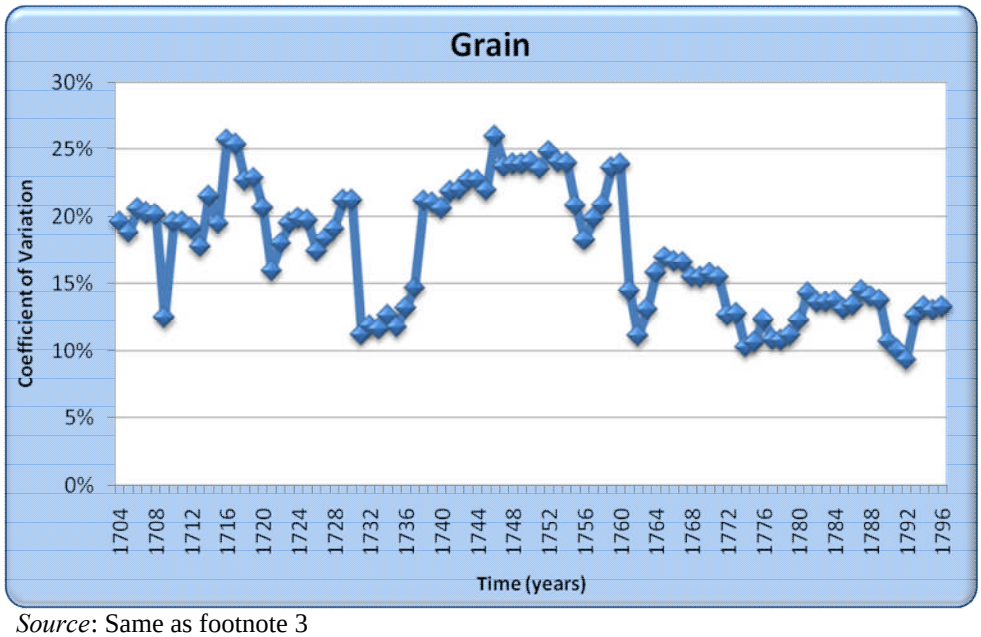


Source: Same as footnote 3

Volatility of the series

Another important aspect to study is the volatility of the production, as in some cases a high volatility can be as damaging for the welfare of the population than a falling production (Persson 2000:106). Therefore, we created new data series using the coefficient of variation of the series with a moving average of 11 years applied to the 6th year to measure the volatility of the production around it. The results show three main phases; during the first phase between 1712 and 1724, there was an increase in the volatility of the series, followed by a second period also very volatile during the 1740s and 1750s. Finally the last quarter of the eighteenth century was characterized by a reduction in the volatility of the series that reached the absolute minimums during the last decades of the century.

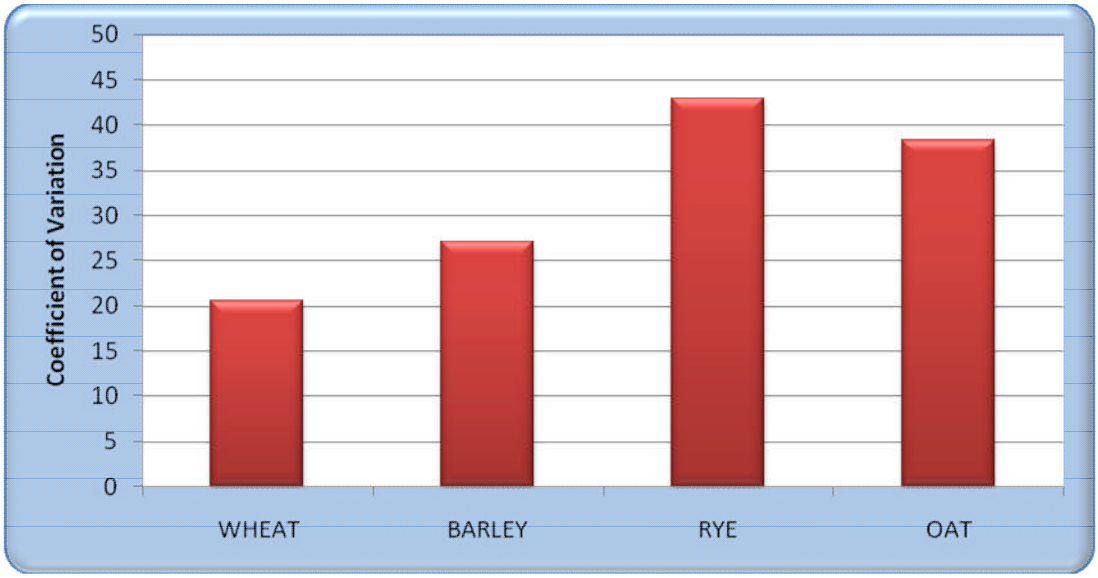
Figure 14: Coefficient of variation in the production of grain (9 years moving average) in Guadalajara 1700-1800



Source: Same as footnote 3

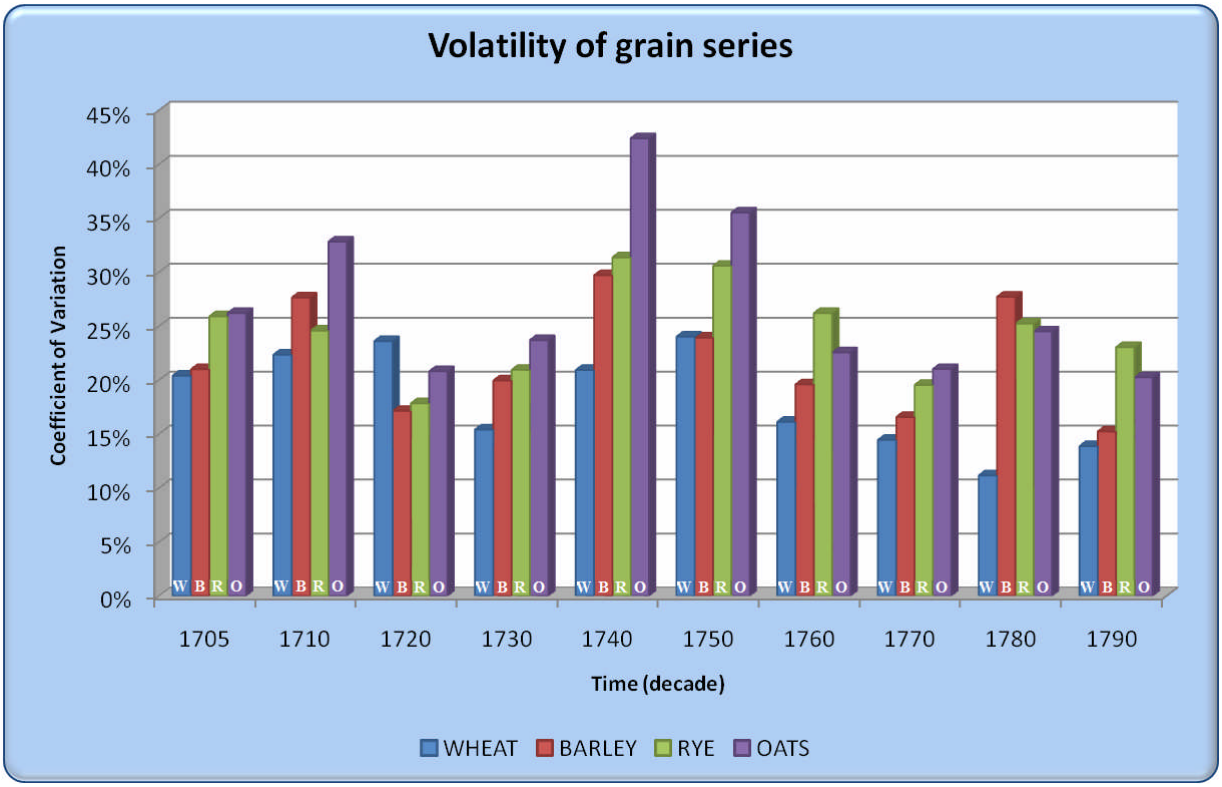
On average and during the whole century the more volatile grains were Rye and Oats with coefficients of variation of 43 and 38 per cent respectively, followed by barley with 27 per cent. Wheat was the most stable of the three grains with a coefficient of variation of 20 per cent. Therefore the two grains that kept and even increased their share in the total production of grain were the ones that maintained a strong stability during the second half of the century, while the decreasing production of barley and rye also coincides with an increase in their volatility. The explanation to these differences probably rely on the sort of land that was used to produce each grain. The best lands were usually used to produce wheat and the most marginal ones to produce inferior grains such as rye and oats. Therefore, when production had to be adjusted for climatic or simply economic reasons the first lands that were abandoned or put again into cultivation where the marginal ones, producing significant changes in the production of the cereals produced on them.

Figure 15: Coefficient of variation in the production of grains in Guadalajara during the 18th century



Source: Same as footnote 3

Figure 16: Coefficient of variation in the production of grains per decade in Guadalajara, 1700-1800

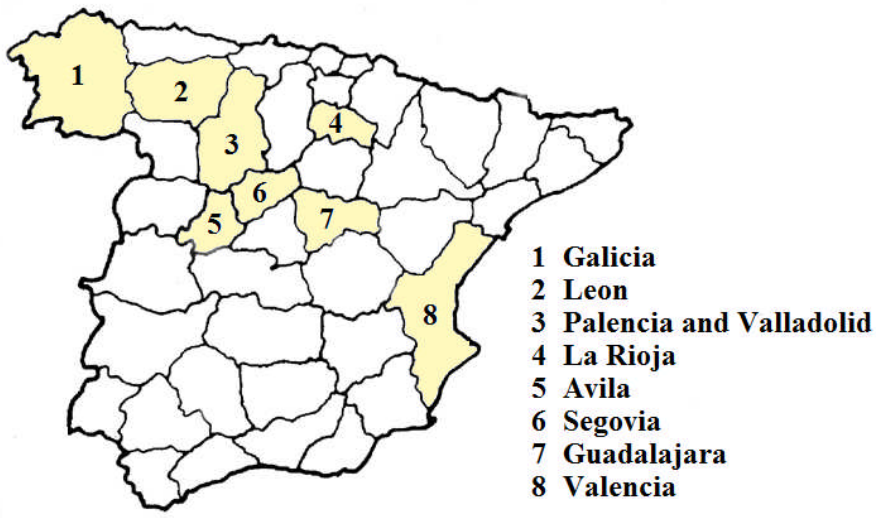


Source: Same as footnote 3

Comparison with other series of Spain

In this section we will compare the production of grain in Guadalajara with other provinces of Spain, in order to put the case of Guadalajara into a broader Spanish context. The provinces analysed include Galicia, Leon, Valladolid, La Rioja, Avila and Segovia in the Crown of Castile and Valencia in the Crown of Aragon, for which we count on production series. The following map shows the location of the different areas included in the study.

Figure 17: Geographical distribution of the series



In the case of Segovia, Palencia, Valladolid, Avila, Leon and La Rioja the information provided is also based on tithe series that therefore estimate real production by using the volume taxed. On the other hand, the series of the periphery in Galicia and Valencia use the deflated evolution of the tithe that was being paid in cash and not in kind. The decadal series of Guadalajara and the other regions are presented in the following table.

Table 1: Tithe Series in Segovia, Palencia and Valladolid and Avila, 1690-1800

Tithe Series (base 100: 1690-1699)						
	Segovia		Palencia and Valladolid		Ávila	
Decade	Wheat	Wheat, Barley and Rye	Wheat	Wheat, Barley and Rye	Wheat	Wheat, Barley and Rye
1690-1699	100	100	100	100	100	100
1700-1709	89	92	100	107	104	115
1710-1719	106	109	94	105	132	141
1720-1729	104	110	109	122	131	148
1730-1739	107	103	118	125	116	126
1740-1749	105	102	118	122	91	108
1750-1759	132	125	132	137	135	154
1760-1769	92	89	91	101	90	109
1770-1779	108	101	113	120	112	125
1780-1789	125	116	-	-	109	120
1790-1799	132	128	-	-	96	113

Source: Llopis 2002

Table 2: Tithe Series in Guadalajara, Leon and La Rioja, 1690-1800

	Guadalajara		León		La Rioja		
Decade	***Wheat***	***Wheat, Barley and Rye***	Wheat	Wheat, Barley and Rye	Wheat	Wheat, Barley, Rye and Oats	Wine
1690-1699			100	100	100	100	100
1700-1709	***100***	***100***	103	104	108	110	91
1710-1719	***102***	***104***	105	103	86	108	83
1720-1729	***118***	***133***	120	119	114	121	99
1730-1739	***117***	***122***	123	124	92	94	107
1740-1749	***119***	***118***	148	131	105	101	114
1750-1759	***141***	***137***	156	141	118	117	111
1760-1769	***112***	***111***	130	117	89	103	88
1770-1779	***119***	***117***	124	108	116	117	113
1780-1789	***111***	***109***	139	118	122	123	108
1790-1799	***117***	***118***	-	-	116	126	113

Source: Llopis 2002 and own series.

Table 3: Tithe Series in Galicia and Valencia,1690-1800

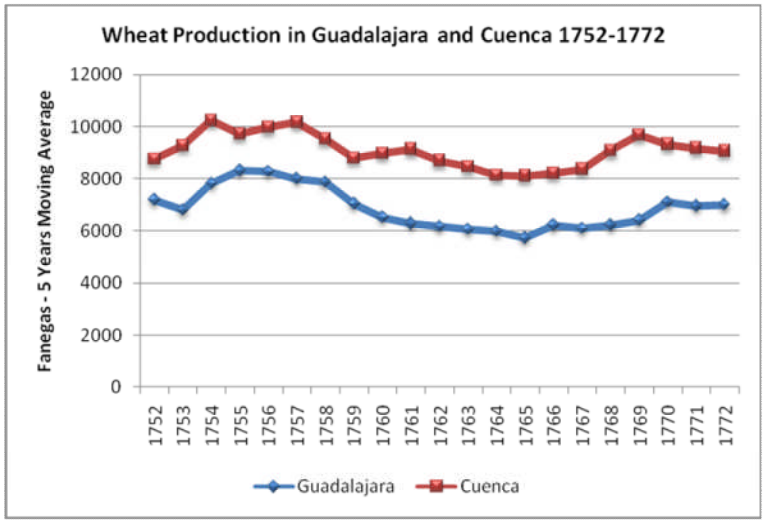
Deflated tithes paid in cash (base 100: 1690-1699)		
Decade	Galicia	Valencia
1690-1699	100	100
1700-1709	108	107
1710-1719	109	110
1720-1729	120	106
1730-1739	108	106
1740-1749	126	137
1750-1759	130	159
1760-1769	128	148
1770-1779	112	190
1780-1789	129	184
1790-1799	127	192

Source: Llopis 2002

Although similar results are obtained, the comparison between Guadalajara and the five regions in the interior do also present some differences. In all the cases the crisis of the 1760s is clearly visible, as the growth that took place immediately before. However while Segovia and La Rioja start a sustained recovery after the crisis, other provinces like Avila or Guadalajara entered a period of very slow growth close to stagnation.

Apart from the long term series presented above, we also count on short term grain series for the province of Cuenca in New Castile (Negrín de la Peña 2005). This series is especially useful in comparative analyses being geographically the closest available to Guadalajara. On the other hand unfortunately the series just include information from 1752 until 1772.m Figure 5.32 presents the yearly series of wheat production estimated for Guadalajara and Cuenca between 1752 and 1772 using a five years moving average. The trends presented in both regions are very similar, including the crisis of the late 1750s and a later recovery in the late 1760s.

Figure 18: Wheat production in Guadalajara and Cuenca, 1752-1772



Source: Same as footnote 3 and Negrin de la Peña (2005)

Conclusion

The eighteenth century was a period of economic growth during its first half and of economic decline and almost stagnation during the second half. The production of grain increased until the 1750s when the crisis of the old regime reduced it and produced a long period of very slow growth during the last third of the eighteenth century. The production of wheat, barley and rye suffered during the crisis while the production of oats did increase during the whole century. Grain production was clearly dominated by the presence of wheat that averaged two thirds of total production during the eighteenth century, although this share increased to almost seventy per cent during the last decades. The weight of barley and rye also decreased while the presence of oats gained importance. On average the volatility of grain production was very high during the first two thirds of the century and was significantly reduced during the last decades. The comparative analysis with other series of grain production show some similarities that

were more common during the first half of the century and also clear differences that started to appear during the second half.

Bibliography

Allen, R.C. “Economic structure and agricultural productivity in Europe, 1300-1800” *European Review of Economic History* 4, 1, pp.1-25.

Alvarez Nogal, C. and Prados de la Escosura, L. “Searching for the roots of retardation : Spain in European perspective, 1500-1850” Universidad Carlos III de Madrid. Departamento de Historia Económica e Instituciones - Instituto Figuerola de Historia EconómicaWorking papers in Economic History 07-06, 2007.

Anes Alvarez, G., *Las crisis agrarias en la España moderna* (Taurus, Madrid, 1970)

Ardit Lucas, M., "Recaudación y fraude diezmal en el siglo XVIII valenciano", *Estructura agrarias y reformismo ilustrado en la España del siglo XVIII.* Madrid 1989, pp. 391-410.

Arizcun Cela, A., *Series Navarras de Precios de Cereales: 1589-1841* (Madrid: Ed. Banco de España, 1989)

Benitez Sanchez-Blanco, R. "Diezmos andaluces: series malaguenas del diezmo del trigo" in Goy J. and Le Roy Ladurie, E. (eds.): *Prestations paysannes, dîmes, rente foncière et mouvements de la production agricole à l'époque pré-industrielle*, París-La Haya, Mouton, 1982, Vol. I, pàgs. 407-416.

Bilbao, L.M. and Fernández de Pinedo, E., ”Evolución del producto agrícola bruto en el País Vasco peninsular, 1537-1850. Primera aproximación a través de los diezmos y de la primicia” in J. Goy and E. Le Roy Ladurie, *Prestations paysannes, dimes, rente foncière et mouvement de la production agricole à l’époque préindustrielle* (Paris : Mouton Éditeur, 1982).

Eiras Roel, A. “ Dîme et mouvement du produit agricole en Galice, 1600-1837” in Goy J. and Le Roy Ladurie, E. (eds.): *Prestations paysannes, dîmes, rente foncière et mouvements de la production agricole à l'époque pré-industrielle*, París-La Haya, Mouton, 1982,

Feliu, G. Precios y salarios en la Cataluña moderna, (Madrid: Banco de España, 1991)

Garcia Sanz, A. ”La produccion de cereales y leguminosas en Castilla la Vieja. Los diezmos del Obispado de Segovia de 1570 a 1800” in Ladurie, E.L.R., and Goy, J., Tithe *and agrarian history from the fourteenth to the nineteenth centuries: an essay in comparative history* (Cambridge, Cambridge University Press, 1982)

Gonzalez Enciso, A. et. al. *Historia economica de la España moderna,*(Madrid, Actas, 1992) p.229.

Goy, J and Ladurie, E. *Prestations paysannes, dîmes, rente foncière et mouvement de la production agricole à l'époque pré-industrielle.* (Paris : Éditions de l'École des Hautes Études en Sciences Sociales : 1982)

Hamilton, H.H., *War and prices in Spain, 1651-1800* (Cambridge, Harvard University Press,1947)

Ladurie, E. and Goy, J., *Tithe and agrarian history from the fourteenth to the nineteenth centuries: an essay in comparative history* (Cambridge, Cambridge University Press, 1982)

Lemeneunier, G. *"*Approche méthodologique des dîmes de Murcie *à l'époque moderne",* in J. Goy and E. Le Roy Ladurie, *Prestations paysannes, dimes, rente foncière et mouvement de la production agricole à l'époque préindustrielle* (Paris : Mouton Éditeur, 1982).

Llopis Agelán, E. (2002): "Expansión, reformismo y obstáculos al crecimiento (1715-1789)", cap. 4 de Comín, Hernández y Llopis (eds.) (2002): *Historia Económica de España (siglos X-XX)*, Barcelona, Crítica.

Lopez-Salazar Perez, J and Martin Galan, M.M. "La produccion cerealista en el arzobispado de Toledo: 1463-1699", *Cuadernos de historia moderna y contemporánea*, Nº. 2, 1981 , pags. 21-104

Marcos Martin, A., *Economia, sociedad, pobreza en Castilla, 1500-1814* (Excma. Diputación Provincial de Palencia, 1985)

Marcos Martin, A., *España en los siglos XVI, XVII y XVIII* (Critica, Barcelona, 2000)

Negrin de la Peña, ""El reconocimiento de la realidad agraria a través de dos fuentes fiscales: Rentas provinciales "vs" Única Contribución. El caso de Cuenca (1749-1774)" paper presented in the XI Congreso de Historia Agraria, Aguilar de Campo (2995)

Palop ramos, J.M. "El producto diezmal valenciano durante los siglos XVII y XVIII. Aproximación a su estudio", in Goy J. and Le Roy Ladurie, E. (eds.): *Prestations paysannes, dîmes, rente foncière et mouvements de la production agricole à l'époque pré-industrielle,* París-La Haya, Mouton, 1982, Vol. I, pàgs. 407-416.

Persson, K.G., *Grain Markets in Europe, 1500-1900: Integration and Deregulation*. (Cambridge: Cambridge University Press, 2000)

Ponsot, P. "En Andalousie occidentale. Les fluctuations de la production du ble sous l'Ancien Regime" *Études rurales*, No. 34 (Apr. - Jun., 1969), pp. 97-112

Ringrose, D.R., *Madrid and the Spanish Economy* (Berkeley-Los Angeles: University of California Press, 1983)

Sebastián Amarilla, J.A., Agricultura y rentas monásticas en tierras de León: Santa María de Sandoval(1167-1835), Doctoral Thesis (Madrid : Universidad Complutense de Madrid, Facultad de Ciencias Económicas y Empresariales, 1992).

Vidal. “La evolución de la producción agrícola en Mallorca durante la Edad Moderna. Fuentes y problemas de su estudio” *Moneda y crédito*, Nº 145, 1978

Tithe series for Guadalajara 1700-1800 (1700-1709=100)

	Wheat	Barley	Rye	Oats
1700	125	98	110	99
1701	129	99	106	97
1702	103	102	101	98
1703	89	96	98	98
1704	126	117	108	102
1705	86	103	96	97
1706	93	97	94	101
1707	84	93	93	100
1708	70	90	92	106
1709	96	106	101	103
1710	60	97	92	103
1711	88	98	100	108
1712	92	102	102	100
1713	92	91	97	98
1714	122	110	106	108
1715	102	93	102	102
1716	95	88	103	97
1717	117	104	103	99
1718	138	106	117	101
1719	128	123	120	108
1720	168	137	122	111
1721	77	123	104	112
1722	110	128	115	108
1723	117	128	120	109
1724	117	122	109	112
1725	123	126	113	110
1726	174	140	116	114
1727	103	122	110	113
1728	108	120	112	109
1729	91	107	105	100
1730	126	128	105	116
1731	112	108	101	110
1732	104	118	103	109
1733	106	99	94	106
1734	117	112	108	110
1735	105	114	105	114
1736	126	115	100	116
1737	113	107	103	113
1738	150	122	105	108
1739	134	114	99	110
1740	102	101	92	102
1741	104	100	95	103
1742	171	152	110	117
1743	129	122	93	113
1744	126	106	102	101
1745	110	108	98	99
1746	119	109	94	100
1747	99	111	89	109
1748	120	113	96	108
1749	100	117	99	114

	Wheat	Barley	Rye	Oats
1750	180	147	108	126
1751	96	105	91	108
1752	122	111	94	109
1753	115	123	93	126
1754	155	122	105	111
1755	135	105	103	103
1756	192	137	105	108
1757	159	117	102	105
1758	116	102	96	105
1759	125	115	91	108
1760	123	119	97	115
1761	105	109	93	107
1762	113	105	92	109
1763	91	99	88	110
1764	114	114	89	117
1765	121	114	94	115
1766	124	125	95	118
1767	94	102	88	111
1768	143	121	92	123
1769	100	101	87	109
1770	133	105	91	109
1771	121	110	92	113
1772	151	106	96	118
1773	122	113	91	119
1774	105	114	93	116
1775	114	120	92	127
1776	122	109	93	124
1777	99	100	92	120
1778	120	103	93	120
1779	114	108	86	131
1780	103	100	90	117
1781	141	119	95	126
1782	122	107	95	113
1783	127	117	100	122
1784	117	86	90	114
1785	96	93	91	111
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1795	111	117	101	140
1796	124	105	95	126
1797	92	99	90	115
1798	140	113	97	125
1799	112	98	96	123
1800	105	97	94	123